

Appl. No : 10/074,881
Amdt. dated : 09/30/03
Reply to Office Action of 09/16/03

Amendments to the Claims:

This listing will replace all prior versions, and listing, of claims in the application.

1. (currently amended) A method for monitoring electron charge effect occurring during semiconductor processing, comprising the steps of:

providing a substrate, a layer of n-type conductivity having been created in ~~the surface of~~ said substrate;

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creating a ~~first~~-pattern of Local Oxidation of Silicon (LOCOS) regions in ~~the surface of~~ said substrate, said ~~first~~ pattern of LOCOS being interspersed with exposed ~~surface~~-regions of said substrate;

etching said exposed ~~surface~~-regions of said substrate using said ~~first~~-pattern of LOCOS regions as a hard mask, creating a ~~first~~-pattern of elevated LOCOS regions, creating trenches having inside surfaces in ~~the surface of~~ said substrate;

creating a layer of interlayer oxide over ~~the surface of~~ said ~~first~~-pattern of LOCOS regions and said inside surfaces of said trenches created in ~~the surface of~~ said substrate;

Appl. No : 10/074,881
Amdt. dated : 09/30/03
Reply to Office Action of 09/16/03

depositing a layer of polysilicon over ~~the surface of~~ said layer of interlayer oxide;

~~patterning and etching~~ said layer of polysilicon, ~~creating~~ a ~~second pattern of polysilicon, the surface of~~ said second pattern patterned layer of polysilicon comprising at least one contact point over ~~the surface of~~ said substrate, completing creation of a electron charge monitoring device having a surface;

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providing a semiconductor processing tool, said semiconductor processing tool being designated as being a tool being evaluated for electron charge effect of a process being performed by said tool;

positioning said substrate comprising said electron charge monitoring device inside said processing tool in a location and a position being identical with a position and location being occupied by a substrate being processed by said tool;

establishing processing conditions of a process as these processing conditions apply for said process and said tool;

exposing ~~the surface of~~ said electron charge monitoring device to said established processing conditions for a period of time having a measurable duration;

terminating said processing conditions;

removing said electron charge monitoring device from said semiconductor processing tool; and

measuring a voltage required to induce a FN tunneling based current between the at least one contact point of said patterned layer of polysilicon and ~~the surface of~~ said substrate.

2. (currently amended) The method of claim 1, said creating a ~~first~~—pattern of Local Oxidation of Silicon (LOCOS) regions in ~~the surface of~~ said substrate comprising the steps of:

depositing a layer of silicon nitride over ~~the surface of~~ said substrate;

patterning ~~and etching~~ said layer of silicon nitride, creating a mask of silicon nitride over ~~the surface of~~ said substrate, elements of said mask being interspersed with exposed ~~surface~~—regions of said substrate;

creating layers of Local Oxidation of Silicon (LOCOS) in said exposed ~~surface~~—regions of said substrate; and

removing said mask of silicon nitride from ~~the surface of~~ said substrate.

3. (currently amended) The method of claim 1, wherein said layer of interlayer oxide ~~being selected from the group consisting of~~ is HTO, [[and]] dry oxide [[and]] or wet oxide.

Appl. No : 10/074,881
Amdt. dated : 09/30/03
Reply to Office Action of 09/16/03

4. (original) The method of claim 1, said layer of interlayer oxide being created to a thickness between about 80 and 300 Angstrom.

5. (original) The method of claim 1, said layer of polysilicon being deposited to a thickness within the range of between 1,500 and 6,000 Angstrom.

6. (currently amended) The method of claim 1, said ~~second pattern patterned layer~~ of polysilicon comprising a square, said ~~first~~—pattern of Local Oxidation of Silicon (LOCOS) regions comprising arrays of LOCOS regions perpendicularly and outwardly extending from each side of said square of said ~~second pattern patterned layer~~ of polysilicon.

Claims 7-11: (cancelled)

12. (currently amended) The method of claim 1, said current induced between said layer of polysilicon and ~~the surface of~~ said substrate being 0.1 μ A.

Appl. No : 10/074,881
Amdt. dated : 09/30/03
Reply to Office Action of 09/16/03

13. (currently amended) A method of creating an electron charge effect monitoring device, comprising the steps of:

providing a substrate, a layer of n-type conductivity having been created in ~~the surface of~~ said substrate;
creating a ~~first~~ pattern of Local Oxidation of Silicon (LOCOS) regions in ~~the surface of~~ said substrate, said ~~first~~ pattern of LOCOS being interspersed with exposed ~~surface~~ regions of said substrate;

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etching said exposed ~~surface~~ regions of said substrate using said ~~first~~ pattern of LOCOS regions as a hard mask, creating a ~~first~~ pattern of elevated LOCOS regions, creating trenches having inside surfaces in ~~the surface of~~ said substrate;

creating a layer of interlayer oxide over ~~the surface of~~ said ~~first~~ pattern of LOCOS regions and said inside surfaces of said trenches created in ~~the surface of~~ said substrate;

depositing a layer of polysilicon over ~~the surface of~~ said layer of interlayer oxide;

patterning and etching said layer of polysilicon, ~~creating a second pattern of polysilicon, the surface of said second pattern patterned layer of polysilicon comprising at least one contact point over the surface of said substrate; and~~

Appl. No : 10/074,881
Amdt. dated : 09/30/03
Reply to Office Action of 09/16/03

measuring a voltage required to induce a FN tunneling based
current between said at least one contact point of said
patterned layer of polysilicon and said substrate after said
substrate has been exposed to a semiconductor processing tool
under known conditions of processing by said semiconductor
processing tool.

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14. (currently amended) The method of claim 13, said creating a ~~first~~ pattern of Local Oxidation of Silicon (LOCOS) regions in ~~the surface of~~ said substrate comprising the steps of:

depositing a layer of silicon nitride over ~~the surface of~~ said substrate;

patterning and etching said layer of silicon nitride, creating a mask of silicon nitride over ~~the surface of~~ said substrate, elements of said mask being interspersed with exposed ~~surface~~ regions of said substrate;

creating layers of Local Oxidation of Silicon (LOCOS) in said exposed ~~surface~~ regions of said substrate; and

removing said mask of silicon nitride from ~~the surface of~~ said substrate.

Appl. No : 10/074,881
Amdt. dated : 09/30/03
Reply to Office Action of 09/16/03

16. (original) The method of claim 13, said layer of interlayer oxide being created to a thickness between about 80 and 300 Angstrom.

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17. (original) The method of claim 13, said layer of polysilicon being deposited to a thickness within the range of between 1,500 and 6,000 Angstrom.

18. (currently amended) The method of claim 13, said ~~second pattern~~ patterned layer of polysilicon comprising a square, said ~~first~~-pattern of Local Oxidation of Silicon (LOCOS) regions comprising arrays of LOCOS regions perpendicularly and outwardly extending from each side of said square of said ~~second pattern~~ patterned layer of polysilicon.

Claims 19-22: (cancelled).

23. (currently amended) The method of claim 13, whereby said electron charge effect monitoring device can be recycled by applying an additional step of thermally annealing said substrate, thereby thermally annealing said electron charge monitoring device having been created in and on ~~the surface of~~ said substrate.

Appl. No : 10/074,881
Amdt. dated : 09/30/03
Reply to Office Action of 09/16/03

97

Claims 24-32: (cancelled).
